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ABSTRACT

This guide is intended for use in providing the classroom portion of training for apprentices in the cabinetmaking and millwork trades. The materials focus on guiding teams of apprentices through the completion of a credenza with step-back hutch that is to be made in the traditional, colonial/country, and contemporary furniture styles. The guide is divided into 12 units. There is one unit for each of the following topics: power hand tools, hand tools, machinery, and finishing. The following topics are covered in two units each: materials, planning processes, machine processes, and assembly. Each unit contains some or all of the following: a unit outline; list of supplemental reading materials; term notes; and a series of class outlines, each of which includes a lecture/demonstration outline, parallel listing of tasks and project steps, and notes to the instructor. The curriculum is holistic in that apprentices may join at any time during the four-year cycle, and it is designed to stress the need for cooperation among apprentices and the concept that, in the workplace, the outcome of teamwork is productivity. (MN)

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OREGON CABINETMAKERS AND WOODWORKERS APPRENTICESHIP TRAINING CURRICULUM INSTRUCTOR'S MANUAL

WRITTEN BY

JOSHUA R.D. GUILAR

This curriculum was written with the assistance of the Oregon Alliance for Program Improvement at Oregon State University, and the Portland Millmen And Cabinetmakers Joint Apprenticeship Training Committee.

NOVEMBER 11, 1985

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THE CURRICULUM

General Notes

This curriculum is intended totrain apprentices in the cabinetmaking and millwork trade. This training is in addition to on the job training that the apprentices undertake at their place of employment. The apprentices have class once a week, three twelve week terms per year. for four years. Each class generally consists of two hours of lecture and two hours of shop work. The curriculum is holistic in that an apprentice may join at any time durino the four year cycle and finish four years later. Therefore, the apprentices will be at various levels of proficiency and skill.

The central focus is a project--a credenza with step back hutch, made in three styles; traditional, colonial/country, and contemporary. The apprentices will divide into teams of two (or three), and make a cabinet in one of the three styles. The styles shall be as equally represented by student teams as is practical.

The Task Inventory

A task inventory was taken in the cabinetmaking and millwork industry throughout the State of Oregon to determine the skills that are needed by those working in the trade. These tasks were systematically organized and prioritized. In this manual the tasks are related to the steps in building the project. Those tasks that are listed in this manual must be covered at least once during the course. If the proper machinery is not available at the instructional facility then the task must be covered through field trips, lecture-demonstrations, or by supplemental readings.

The instructor's manual lists lecture topics and gives an outline of tasks for each class. If a task is followed by a number in parenthesis, the number indicates another term in which that task is primarily listed. If a task is not followed by a number in parenthesis, that task must be covered at least once during the term in which it is listed.

Special Characteristics of the Curriculum

One special characteristic of the curriculum is the need for cooperation among the apprentices. Teamwork with the outcome of learning is essential. In the work place the outcome of teamwork is productivity. In the classroom the importace and wherewithall of productivity must be taught.

However, the learning environment must stress inquiry, understanding,and mastery of skills.

The curriculum is holistic in the sense that many steps in building the project require a synthesis of skills found in other portions of the content. Advanced apprentices should be teamed with new apprentices to make sure that no one is left behind.

Research projects done by the apprentices are encouraged. A format for research reports is given in the supplemental text which accompanies the curriculum. Research reports will involve the apprentices in finding and sharing information. A library should be made available to the apprentices for this purpose.

Each apprentices will be working in a team on a specific credenza style. Each task in the inventory is not necessarily represented in each credenza style. Therefore, the instructor must involve the class as a whole in unique tasks involving only one style. For instance, the tasks involving plastic laminate are utilized directly only in the contemporary style credenza. The apprentices working on other styles must learn from from the work done on the contemporary credenza. Also, the apprentices working on other styles must practice with plastic laminate by incorporating it into jigs and templates related to the project.

It may occur that apprentices will have to wait for the availability of machinery in the shop. If this is the case, try to have other activities on hand to best use the apprentice's time.

Apprentices should read ahead in the text before coming to class so that they can discuss the lecture topics.

The Instructor

The instructor is critical to the sucess of any classroom curriculum. The outlines given in this manual represent the minimum activities necessary to cover the content and fill the time. The instructor must be prepared with additional activities. The tools in the instructional shop and the experise of the instructor may vary. It is not possible to determine in this manual the exact arranging of events during each class. Therefore, the instructor must preview each class's outline and adjust it to specific circumstances.

The instructor must fascilitate an environment of cooperation and inquiry in the classroom.

This manual has blank left hand pages. The instructor can use these pages for notes relevant to each class. These notes will be critical to the review and evolution of the curriculum.

Testing

Testing is to occur at the end of each term. However, either through quizzes or recitation the instructor should determine if the students are learning throughout the term. If there are learning problems the instructor should remediate. If any apprentices demonstrate a lack of reading or writing skill they should be guided into professional remediation.

Supplemental Modes of Instruction

The lecture-demonstration segment of each class can be enriched with a variety of instructional modes like: guest speakers, research reports done by the apprentices, field trips, films, slides, discussions, film strips, and off-prints.

The shopwork segment of each class can be enriched with additional research and skill development activities.

Materials

The materials provided for this curriculum consist of the following:

1) An instructor's manual consisting of an introduction to the curriculum, a class by class listing of lecture topics, tasks, project steps, and reading materials.

2) A set of two foot by three foot drawings of the project.

3) A set of drawings, cutting bills, material bills and route sheets for each term.

4) A supplemental text consisting of specially created classroom and home study materials for specific terms.

Text and Supplemental readings

The text for the course is Cabinetmaking and Millwork, by John L. Feirer. Supplemental readings are also listed for each term.

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TERM ONE: POWER HAND TOOLS QUARTER

OUTLINE		CHAPTER
CLASS 1	Portable saws	30
	A) Blade types and uses	
	B) Circle saw	
	C) Mitre box	
CLASS 2	Portable saws	30
	A) Hand Jig	
	B) Reciprocating saw	
CLASS 3	Router	33
	A) Bits	
	B) Laminate	
	C) Size for job	
	D) Template	
	E) Splining	
	F) Butterfly seam	
	G) Dado cleaners	
CLASS 4	Router	33
	A) Table	
	B) Shaper work	
	C) Horizontal router jointer	
CLASS 5	Pneumatic and powder actuated guns	
	A) Types of loads	
	B) Application	
CLASS 6	Variable reversing drill and screw gun	34
CLASS 7	Wood welder	40
CLASS 8	Belt sander	36
CLASS 9	Orbital sander	36
	A) In line	
	B) Other, random	
CLASS 10	Misc. power planes, shears, pop riveter	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

A
22 The Use of Portable Power Tools
Leo P. McDonnell and Alson I. Kaumeheiwa
Delmar
218p. 1980

F59
141 Getting The Most Out Of Your Abrasive Tools
Rockwell International
122p. 1979

A7
165 Welding With wood
Workrite Products Company
30p.

A
215 Milwaukee Training Manual
Milwaukee Electric Tool Company
237p. 1980

TERM NOTES

During the power hand tools quarter the apprentices will fashion a rail and stile door. The steps provided for each class can be adjusted as necessary. The steps listed should be the minimum necessary to fill the time and therefore the instructor should be prepared with practice activities to augment the content.

Those student teams working on a contemporary cabinet will make a frame and raised panel door, although these doors will not be incorporated in their finished cabinet.

CLASS 1: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Introduction
Portable saws
A) Blade types and uses
B) Circle saw
C) Mitre box

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use math and geometry for layout (5)	Select material for the rails and stiles; layout cutting lines.
Use circle saw	Rip rails and stiles with a cirulular saw (the instructor may demonstrate the use of a fence and clamps to guide the saw).
Use circle saw	Rip the boards for the raised panel.
Use mitre saw	Cut boards to length with the mitre saw.
Use clamps (10)	If necessary, edge glue boards for the raised panel.

NOTE

If a task is followed by a number in parenthesis, the number indicates the term in which that task is primarily listed.

CLASS 2: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Portable saws
- A) Hand jig
- B) Reciprocating saw

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use scriber (5) Determine materials (5)	Select materials for the top rail template; layout the template.
Use scriber (5) Determine materials (5)	Select materials for the raised panel template; layout the template.
Use jig saw	Cut parts for the templates. (oversize)
Choose type of cutting head or tool (8) Use disk sander (8)	Sand or shape the template parts for fit.

NOTE

The instructor is encouraged to include the use of plastic laminate in the templates. The plastic laminate can be added in later classes when routers and router bits are covered.

CLASS 3: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Router

A) Bits
B) Laminate
C) Size for job
D) Template
E) Splining
F) Butterfly seam
G) Dado cleaners

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use screw gun Use variable speed reversing drill Use pneumatic stapler	Assemble the templates using screws and staples.
Use jig saw	Layout and rough cut the top rail.
Use router template Use table router	Finish shape the top rail on the router table.

CLASS 4: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Router
- A) Table
- B) Shaper work
- C) Horizontal router jointer

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use router table	Mill the bottom rail and stiles to finished width.
Use router	Mill one corner of the door for router spline joint.
Use router	Mill one corner of the door for a router-made mortise and tenon joint.

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CLASS 5: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Pneumatic and powder actuated guns
- A) Types of loads
- B) Application

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use variable speed reversing drill Choose type of cutting head or tool (8)	Mill one corner of the door for dowell joint.
Choose type of cutting head or tool (8)	Mill one corner of the door with joint of apprentice's choice.

CLASS 6: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Variable reversing drill and screw gun

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use router templates	Cut the panel to size.
Use thickness planer (7)	Thickness plane or thickness sand the panel to required thickness.
Use single-spindle shaper (7)	Field the panel.

NOTE

The single-spindle shaper is covered in detail in term number seven. During this class the shaper can be set up by the instructor or an advanced apprentice and beginners can be involved at the instructor's discretion.

CLASS 7: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Wood welder

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use spline cutter Choose type of cutting head or tool (8)	Cut dado in rails and styles to fit the panel.
Pre-assemble to determine fit (10)	Assemble the door without glue to determine fit.
Fasten with glue heating unit (wood welder)	Glue the door with the wood welder.

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CLASS 8: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Belt sander

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use belt sander	Belt sand the door on both sides.
Use belt sander	Practice belt sanding on samples of cabinet scribes, self edged counter tops, and end grain.

CLASS 9: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Orbital sander
- A) In line
- B) Other, random

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Choose type of cutting head or tool required (8)	Edge sand the door.
Use orbital sander	Finish sand the door.

CLASS 10: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Misc. power planes, shears, pop riveter

NOTE

During class ten or eleven the instructor may conduct a field trip or use the time to complete and augment course content.

CLASS 11: POWER HAND TOOLS TERM

Fill, overrun, and review

CLASS 12: POWER HAND TOOLS TERM

Testing

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TERM TWO: HAND TOOLS TERM

OUTLINE		CHAPTER
CLASS 1	Tape measure and steel square A) Reading and calculations B) 3,4,5 rule C) Steel square uses D) Staight edge (making, care, and uses)	19
CLASS 2	Marking and layout tools A) Level B) Plumb bob C) Chalk line D) Miscellaneous	19
CLASS 3	Files and saws A) Crosscut B) Miscellaneous C) Files	20
CLASS 4	Drill bits	22
CLASS 5	Clean and sharpen hand tools	24
CLASS 6	Planes A) Block plane B) Others	21
CLASS 7	Chisels and hand scrappers	21
CLASS 8	Miscellaneous hand tools A) Hammers B) Others	
CLASS 9	Hand work part to specified fit	40
CLASS 10	Clamp styles and practice A) Pinch dogs B) Others	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

B
2 Hand Woodworking Tools
Leo P. McDonnell and Alson I. Kaumeheiwa
Delmar
273p. 1978

B
40 Handtool Handbook For Woodworking
R. J. DeCristoforo
H. P. Books
184p. 1977

B1C
76 The Steel Square
H. H. Siegele
192p. 1982

G9
139 Getting The Most Out of Your Drill Press
Rockwell International
121p. 1978

F59
141 Getting The Most Out of Your Abrasive Tools
Rockwell International
122p. 1979

B
169 Clamps-Their History and Their Uses
Cincinnati Tool of Warren Tool
16p.

TERM NOTES

The project part to be made this term is a raised panel. To reinforce the theory during this term the apprentices will make templates or jigs of the instructor's or the apprentice's choice. These activities should be designed to cover as many of the tasks as possible.

During this term topics like the framing square should be covered in depth. Therefore, the project work time can be adjusted to compensate.

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CLASS 1: HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Introduction
Tape measure and steel square
A) Reading and calculations
B) 3, 4, 5 rule
C) Steel square uses
D) Straight edge (making, care, and uses)

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use math and geometry for layout (5)	Select the materials for and layout a straight edge. This can be done with the class as a whole making one straight edge.
Determine type of cutting head or tool required	Make the straight edge.

NOTE

Activities should include applications with the steel square and the 3, 4, 5 rule.

CLASS 2: HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Marking and layout tools
A) Level
B) Plumb bob
C) Chalk line
D) Miscelaneous

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use chalk line Use scribers Use calipers Mark angular and parallel lines with framing square Measure materials with pull-out tape	Select materials and layout parts for template or jig of apprentice's or instructor's choice.

CLASS 3: HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Files and saws
A) Crosscut
B) Miscellaneous
C) Files

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Hand work part to specified fit Use hand saws Use clamps Use screw drivers Use block plane Use files	Cut, fit, and assemble the jig or template (use various hand saws to dimension the template parts; use a block plane and files to fit and refine parts; use clamps to assemble).

CLASS 4: HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Drill bits

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use countersinks Use screw drivers Use drill bits	Reinforce clamped members of jigs or fixtures with countersunk screws.
Use hammer Use nail set	Reinforce clamped members of jigs or fixtures with countersunk nails.
Use putty knife	Fill the countersunk holes with putty.
Use drill bits	Drill large (approximately one inch) holes for practice. Drill the holes in scrap material or in a jig (for the jig to be hung up on the wall).

CLASS 5: HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Clean and sharpen hand tools

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use wrenches Use bench grinder Clean and sharpen hand tools	Clean and sharpen a plane iron. Use wrenches to adjust the plane blade grinding attachment on the bench grinder.
Use block plane Use other planes	Joint one edge of a piece of practice lumber (the lumber could later be incorporated into the panel).
Used bench grinder Clean and sharpen hand tools	Grind, hone, and clean a chisel.
Use chisel	Practice with a sharp chisel by putting a chamfer on the end grain edge of a piece of practice lumber.
Use file Clean and sharpen hand tools	Clean and sharpen a cabinet scraper blade.
Use cabinet scrapers	Refine the edge of previously planed board with a sharp cabinet scraper blade.

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CLASS 6: POWER HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE:

Planes
A) Block plane
B) Others

SHOP WORK: TIME-2 HOURS:

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Mark angular and parallel lines with framing square Use math and geometry for layout (5)	Select and layout material for the panel.
Choose type of cutting head or tool required	Mill boards for the panel. Leave one face of one board rough.
Use other planes Use calipers	Plane the panel flat and true. Square edges and check thickness with calipers.
Glue boards edge to edge Use clamps	If necessary, edge glue boards for the raised panel.
Determine materials (5) Choose type of cutting head or tool	Make bench dogs to later secure the panel to the bench top for planing. (this activity is optional)

CLASS 7: HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Chisels and hand scrapers

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use hand scrapers	Scrape off excess glue from the panel. (Use glue scraper)
Use thickness planer (7)	Thickness plane or thickness sand the panel to required thickness.
Use hand scrapers	Use cabinet scrapers to refine the faces of the panel.
Use math and geometry for layout (5)	Layout the fielding on the panel.
Use other planes Use chisels	Field the panel to rough thickness. Leave enough material to remove later with the shaper.
Use chisels Use hand scrapers	Use chisels and hand scrapers to further refine templates or jigs made by the apprentices.
Use chisels Use other planes Use hand scrapers	Do practice joinery on scrap. (optional)

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CLASS 8: HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Miscellaneous hand tools
A) Hammers, etc.

SHOP WORK: TIME-2 HOURS

TASKS	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use dividers	Set out the curve on the panel with dividers.
Use coping saw Use keyhole saw	Use either saw to cut the curve in the top of the panel.

CLASS 9: HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Hand work part to specified fit

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Hand work part to specified fit Use hand saws Use clamps Use screw drivers Use block plane Use files	Cut, fit, and assemble the jigs or templates (use various hand saws to dimension the template parts; use block plane and files to fit and refine parts; use clamps and screws to assemble).
Hand work part to specified fit Use chisels	Rabbet the bottom edge of the panel to fit in the dado of the door frame members. Leave the panel oversize so it can be cleaned up later with the shaper.

NOTE

During this class an additional template is milled and assembled with hand tools. A suggestion for the template is given in the supplemental materials.

CLASS 10: HAND TOOLS TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Clamp styles and practice
A) Bar clamps
B) Pinch dogs
C) Fast action clamps
D) Others

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use clamps Glue boards edge to edge	The instructor should mock up an edge glued panel to demonstrate the technique.
Use clamps	As above, the instructor should demonstrate with parallel clamps, fast action clamps, corner clamps, and pinch dogs.
Use level	Practice using the level.

NOTE

During class ten or eleven the instructor may conduct a field trip or use the time to complete and augment the course content.

CLASS 11: HAND TOOLS TERM

Fill, overrun, and review

CLASS 12: HAND TOOLS TERM

Testing

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TERM THREE: MATERIALS TERM 1

OUTLINE		CHAPTER
CLASS 1	Wood	5
	A) Nomenclature	
	B) Introduction	
CLASS 2	Wood	5
	A) Cutting	
	B) Measure	
	C) Handling	
	D) Defects	
CLASS 3	Softwood identification	6
CLASS 4	Softwood identification	
CLASS 5	Hardwood identification	7
CLASS 6	Hardwood identification	
CLASS 7	Milling procedures	10
	A) Wood action	
	B) Millwork terms	
	C) Wood bending	
	D) Shaping	
CLASS 8	Adhesives Technology	40
	A) Contacts	
	B) Glues	
	C) Mastics	
	D) Others	
CLASS 9	Adhesives application	
CLASS 10	Abrasives	36
	A) Finish problems	
	B) Other	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

C8
32 Adhesives and Glues: How To Choose And Use Them
Fobert S. Miller
Franklin Chemical Industries
186p. 1980

C
84 Understanding Wood
R. Bruce Hoadley
Tauton Press
256p. 1980

C8
100 Adhesive Bonding Of Wood
M. L. Selbo
Drake
119p. 1978

TERM NOTES

During this term the apprentices will work on the counter-top for the credenza. The materials terms are heavy in theory and therefore work on the project itself will proceed slowly.

The materials terms are an excellent time for research projects to be done by the apprentices. The format for research projects and an example report can be found in the supplemental materials. The apprentices can do research using the library and give a final report to the whole class later in the term.

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CLASS 1: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Introduction
Wood
A) Introduction
B) Nomenclature

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Select lumber for size and identify species Inspect for knots Hand carry materials, rough or machined	Select the material for self edging.

CLASS 2: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Wood
A) Cutting
B) Measure
C) Handling
A) Defects

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Mill rough lumber to straight and square	Cut the materials for the self edge.
Inspect for knots Inspect product for splits Check for crown and warp Inspect product for holes Select lumber for size and identify Inspect for blemishes Use factory trucks, 4-wheel dolly or hand truck	Inspect with the apprentices samples of various woods in shop storage, and move them with trucks as appropriate.

CLASS 3: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Softwood identification

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Determine materials	The apprentice teams should test the samples of softwoods for the following: 1) resistance to denting; 2) appearance; 3) cutting qualities; 4) sanding qualities; 5) stability; 6) others of the apprentices discernment like cost, and water resistance.

NOTE

During these classes the apprentices will do some inquiry activities. In these,activities the apprentices will do research and testing of materials and products utilized in the cabinetmaking and millwork trade.

The instructor should be prepared with one set of samples for each apprentice team. The set of samples should represent at least four different species of softwoods.

The apprentices should keep a log detailing the process and results of their research.

CLASS 4: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Softwood identification

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Inspect for stain and color	Use the samples of softwood to determine their suitability to stain.

NOTE

The apprentices will do research in the utilization of softwoods for stained products. The apprentices should keep a log detailing the procedures and results of their research.

CLASS 5: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Hardwood identification

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Determine materials	The apprentice teams should test the samples of hardwoods for the following; 1) resistance to denting; 2) appearance; 3) cutting qualities; 4) sanding qualities; 5) stability; 6) others of the apprentices discernment like cost, and water resistance.

NOTE

The instructor should be prepared with one set of samples for each apprentice team. Each set of samples should have at least four different species of hardwoods.

The apprentices should keep a log detailing the process and results of their research.

CLASS 6: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Hardwood identification

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Inspect for stain and color	Use the samples of hardwood to determine their suitability to stain.

NOTE

The apprentices will do research in the utilization of hardwoods for stained products. The apprentices should keep a log detailing the procedures and results of their research.

CLASS 7: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Milling procedures
A) Wood action
B) Millwork terms
C) Wood bending
D) Shaping

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Determine materials	The apprentice teams should test samples of hardwoods to determine their suitability to bending. (use different grades, species, thicknesses and widths of lumber)
Determine materials Use math and geometry for layout (5)	Select materials for the curved portions of the counter self edge; layout the curved portions of the self edge.

NOTE

The instructor should be prepared with hardwood for the apprentices to do research in bending. If possible, demonstrate different methods of bending wood.

The apprentices should deep a log detailing the process and results of their research in bending hardwoods.

CLASS 8: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Adhesives technology
A) Contacts
B) Glues
C) Mastics
D) Others

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use white glue Use yellow glue Use urea resin glue (brown) Determine materials	The apprentice teams should test different types of glue by fastening wood scraps with glue under a variety of controlled conditions. Set these samples aside--stress tests can be done during the next class.
Fasten parts together with glue only Match grain of inter-related parts	Glue together the laminated corner.

NOTE

The instructor should be prepared with different types of glue and wood for the apprentices to do their research with.

The apprentices should keep a log detailing the process and results of their research.

CLASS 9: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Adhesives application

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Determine materials	The glues that were used in class number eight research should be tested here to determine their characteristics.

NOTE

The instructor should be prepared with ideas for materials testing and research.

The apprentices should keep a log detailing the process and results of their research.

This class can include practice with adhesive application techniques.

CLASS 10: MATERIALS TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Abrasives
A) Types
B) Uses
C) Finish problems

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Inspect for blemishes Sand to prepare for finish Inspect product for splits Inspect for knots Inspect product for holes Inspect for stain and color	Locate glue spots and sanding problems that will show up in the finish on the doors that were made during the power hand tools term. (use laquer thinner)
Sand to prepare for finish Determine materials	Research different sanding or refining techniques considering the following criteria; 1) time involved 2) suitablity for finish.

NOTE

The instructor should be prepared with the necessary materials for the research, and the apprentices should keep the customary log.

CLASS 11: MATERIALS TERM 1

Fill, overrun, and review
Optional field trip

CLASS 12: MATERIALS TERM 1

Testing

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TERM FOUR: MATERIALS TERM 2

OUTLINE		CHAPTER
CLASS 1	HP plastic laminate	43
	A) Types	
CLASS 2	Veneer and plywood	8
	A) Matches	
	B) Veneer technology	
	C) Equipment	
	D) Grading type plywood	
CLASS 3	Composite board	9
	A) Particle	
	B) Waferboard	
	C) Hardboard	
	C) Homosote	
CLASS 4	Fasteners	11
	A) Staples	
	B) Screws	
	C) Nails	
	D) KD	
CLASS 5	Hardware	12
CLASS 6	Hardware	12
CLASS 7	Cloth and upholstery	
CLASS 8	Acrylic plastic	
CLASS 9	Glass	13
CLASS 10	Metalwork	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

C8
32 Adhesives and glues: How To Choose And Use Them
Robert S. Miller
Franklin Chemical Industries
186p. 1980

C
84 Understanding Wood
R. Bruce Hoadley
Taunton Press
256p. 1980

C8
100 Adhesive Bonding Of Wood
M. L. Selbo
Drake
119p. 1978

CLASS 1: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Introduction
HP plastic laminate

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Choose type of cutting head or tool required	Cut the plastic laminate for the credenza counter.
Choose type of cutting head or tool required	Select materials for the jig: layout the parts for the jig.

NOTE

A suggestion for a jig used with the table saw is given in the supplemetary materials. Those students who are not working on a contemporary cabinet can make one of these jigs in order to apply the theory they are learning about plastic laminate.

Also, it is suggested that the instructor designs an activity for the apprentices to research the characteristics of plastic laminate. For example, spare chains of plastic laminate available from manufacturers could be subjected to controlled and documented testing.

CLASS 2: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Veneer and plywood
A) Matches
B) Veneer technology
C) Equipment
D) Grading plywood

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use variety table saw (8)	Cut the plywood for the counter top--traditional and colonial/country style cabinets.
Match grain of inter-related parts Layout veneer matches	With scrap or reusable materials, layout and experiment with different veneer matches.
Use fork lift Stack material for storage Select sheet stock by grade Use factory trucks 4-wheel dolly or hand truck	Investigate the inventory of sheet stock in the instructional shops and move the stock as necessary for practice with shop trucks.

NOTE

The instructor may arrange a field trip to a local business which specializes in veneer work. For example, the Charles Grant Company in Portland would be a good place to visit. If possible, veneer the counters for the traditional and colonial/country style cabinets.

CLASS 3: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Composite board
A) Particle
B) Waferboard
C) Hardboard
D) Homosote

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Hand carry materials, rough or machined Use variety table saw (8)	Cut the chipboard for the counter of the contemporary cabinet.
Determine materials	Make the build-up for the self edge.
Determine materials	The apprentice teams will test samples of sheet stock for a variety of characteristics like; 1) density 2) resistance to liquids 3) adhesion with glues 4) behavior with fasteners 5) milling characteristics 6) cost 7) stability 8) appearance.

NOTE

The instructor should be prepared with various samples of sheet stock for research by the apprentices. The apprentices should keep the customary log.

CLASS 4: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Fasteners
A) Staples
B) Screws
C) Nails
D) KD

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Roll contact cement	Apply plastic laminate to the chipboard.
Use yellow glue	Apply self edge to the credenza counters.
Determine materials	The apprentice teams may use a variety of staples, screws, nails and KD fasteners to assemble materials. The materials joined can then be subjected to tests, and conclusions arrived at concerning the suitability of various fasteners for different purposes.

NOTE

The instructor should be prepared with research materials and the apprentices should keep the customary log.

CLASS 5: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Hardware

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Select screws, staples, and nails by size and type Determine materials	Apprentice teams will research the hardware used in the project. Research can be done in the shop or in the library. Each team will develop a report that describes the advantages and disadvantages of different hardware ideas for the credenzas.

CLASS 6: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Hardware

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Determine materials	The apprentices will work on their own research projects.

CLASS 7: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Cloth and upholstery

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Determine materials	The apprentices will work on their own research projects.

CLASS 8: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Acrylic plastic

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Choose type of cutting head or tool	Each team will make a five sided acrylic box to be used during the planning processes terms.
Determine materials	The apprentices will work on their own research projects.

CLASS 9: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Glass

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Safety practices are demonstrated in the shop.
Determine materials	The apprentices will work on their own research projects.

CLASS 10: MATERIALS TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Metalwork

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Safety practices are demonstrated in the shop.
Determine materials	The apprentices will work on their own research projects.

NOTE

During the later part of this term is a good time for apprentices to present a research report to the class as a whole. This is good practice for developing communications skills for the workplace.

During this term it is recommended that the instructor arranges for field trips either to manufactures of materials or to secondary manufacturers who specialize in using specific materials relevant to this term.

CLASS 11: MATERIALS TERM 2

Fill, overrun, and review

CLASS 12: MATERIALS TERM 2

Testing

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TERM FIVE: PLANNING PROCESSES TERM 1

OUTLINE		CHAPTER
CLASS 1	Business principles	
	A) Labor relations	
	B) Accounting	
	C) Overhead	
CLASS 2	Communications Skills	
	A) Teamwork	
	B) Nomenclature	
	C) Supervision	
	D) Training personnel	
CLASS 3	Production setup	
	Specifications	
CLASS 4	Building prints	
	A) Measuring jobs	2&3
CLASS 5	Design elements	
	A) What makes a box rigid	
	B) History	
	C) Furniture design	
	D) History and human measure	
CLASS 6	Sketching	16
CLASS 7	Sketching	
CLASS 8	Detailed print reading	
CLASS 9	Detailed print reading	
CLASS 10	Fill, overrun, and review	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

IE2
20 Practical Problems In Mathematics For Carpenters
Harry C. Huth
Delmar
217p. 1979

E5
28 Furniture Construction
Rudolph Willard
North Carolina State
321p. 1982

E
31 Furniture Manufacturing Processes
Anco L. Prak and Thomas W. Myers
North Carolina State
175p. 1981

E6
435 Rapid Viz-A New Method For The Rapid Visualization Of Ideas
Hanks and Belliston
William Kaufmann, Inc.
149p. 1980

E8
136 Drafting Technology And Practice
Dr. William P. Spence
Bennett Pub.
807p. 1980

E7
206 Architectural Casework Details
Architectural Woodwork Institute
11p. 1969

TERM NOTE

The planning process terms are formatted differently than the other terms. The apprentices will work on their activities mostly in the classroom rather that in the shop. It is recommended that the instructor alternate lectures with student activities, throughout the four hour class, with breaks at appropriate intervals. The classroom should be equiped with tables large enough for drawing and blueprint reading. There is a text which accompanies the planning process classes. **Apprentices should read ahead** and then use the text during the classroom activities.

The instructor should note that the tasks are formatted differently for the planning processes terms. The tasks from the surveys are given in the body of the text in **bold print.** These tasks must either be covered by the activity suggested or by an activity of the instructor's choosing.

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CLASS 1: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Introduction
Business principles
A) Labor relations
B) Accounting
C) Overhead

STUDENT ACTIVITY OUTLINE

A) Manufacturing-value added to raw materials

Discuss the kinds of manufacturing that the apprentices do at their place of employment

B) The free market system

Discuss the free market system with the apprentices. What role does profit play? What role does capital play? What are the benefits of a highly capitalized industry?

NOTE

The discussions which relate to business or labor are are to be moderated by the instructor. The intent here is to promote understanding, aquaintance with issues, and discussion. Guest speakers from labor and management would enrich these topics.

SUPPLEMENTAL ACTIVITY

Apprentices can be assigned an article review. A pulication like the Wall Street Journal, a labor publication, or Forbes magazine would tend to have articles relevant to manufacturing, labor relations, or the free market system.

CLASS 2: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Communication skills
A) Teamwork
B) Nomenclature
C) Supervision
D) Training personnel

STUDENT ACTIVITY OUTLINE

A) Management

Discuss the role of management in the businesses where the apprentices work. What jobs do managers do? Is management necessary?

B) Direct and indirect labor

Discuss how the proportion of direct to indirect labor has changed through the evolution of our economic system. How has productivity and technology affected this change from mostly direct labor to more and more indirect labor in the workplace.

C) Teamwork

Discuss teamwork on the job. How can it be helpfull to productivity? Discuss how the apprentice teams are doing on the project.

D) Task--**Train personnel in procedures** Because this task appears as a high priority in the task inventory this activity must covered.

The apprentices form into groups (different from the project groups,) and take turns giving instructions to the other apprentices on safety procedures in the shop.

CLASS 3: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Production set up
Specifications

STUDENT ACTIVITY OUTLINE

A) Productivity

Apprentices discuss the importance of productivity to; 1) an individual business, 2) a nation's economy, 3) the standard of living of the average individual in that nation. (per capita income).

Apprentices make suggestions (oral or written) as to how they would increase productivity on the project.

Apprentices discuss how Japanese workers promote productivity. (optional)

B) Production set up

The apprentices write a report on how they would improve a production set up in the instructional shop or in the shop in which they are employed.

C) Specifications

Apprentices make a list of specifications for the project using a uniform format.

CLASS 4: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Building prints
A) Measuring jobs
B) Other

STUDENT ACTIVITY OUTLINE

A) Measuring jobs

The apprentices measure the classroom and consider how cabinets would fit wall to wall or floor to ceiling. Problems measuring jobs are discussed and solutions formulated.

B) Trade terms

Review the trade terms found in the text with the students.

C) Supervisors

Problems in industrial supervision are discussed. What problems have the apprentices seen in relationships between workers and supervisors on the job? How can communication be improved so that problems are solved? What are the qualities of a good supervisor? What are the qualities of a good employee?

D) Cooperation between labor and management

Do labor and management have the same goals? What are the major issues between labor and management today?

CLASS 5: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Design elements
A) What makes a box rigid
B) History
C) Furniture design
D) Human measure

STUDENT ACTIVITY OUTLINE

A) Human measure

Apprentices examine the human measurement materials in the apprenticeship library.

B) Box dynamics--what makes a box rigid

Task--**use math and geometry for layout**

Apprentices study the North Carolina State University publication, Case Goods Rigidity. Make and save a cardboard box.

C) History

Show slides of historical and contemporary furniture styles.

Apprentices discuss the different historical furniture styles. What are their favorite styles? How important is furniture in the world of decorative art?

Discuss the furniture styles used in the project. What aspects of the disigns do the apprentices like and dislike? Explain.

D) Kitchen design

Given certain perameters the apprentices design a kitchen layout.

Show slides of different kitchen styles. Discuss the styles with the students.

CLASS 6: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Sketching

STUDENT ACTIVITY OUTLINE

Task--**sketch**

A) Sketching activity number 1

B) Sketching activity number 2

CLASS 7: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Sketching

STUDENT ACTIVITY OUTLINE

Task--**Use architectural scale**

Task--**Read drawings (sketches)**

A) Sketching activity number 3

B) Sketching activity number 4

NOTE

Details about the activities listed above are to be found in the supplemental text which accompanies the curriculum.

CLASS 8: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Detailed print reading

STUDENT ACTIVITY OUTLINE

Task--**Read architectural drawings**

A) Print reading activity number 1

B) Print reading activity number 2

CLASS 9: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Detailed print reading

STUDENT ACTIVITY OUTLINE

Task--**Read blueprints (detailed shop drawings)**

A) Print reading activity number 3

B) Print reading activity number 4

NOTE

Details about the activities listed above are to be found in the supplemental text which accompanies the curriculum.

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CLASS 10: PLANNING PROCESSES TERM 1

LECTURE OUTLINE

Fill, overrun, and review

CLASS 11: PLANNING PROCESSES TERM 1

Fill, overrun, and review

CLASS 12: PLANNING PROCESSES TERM 1

Testing

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TERM SIX: PLANNING PROCESSES TERM 2

OUTLINE		CHAPTER
CLASS 1	Cutting lists	
CLASS 2	Math and basic geometry	
CLASS 3	Layout	16
CLASS 4	Layout	
	A) Patterns	
	B) Templates	
CLASS 5	Materials lists	15
	A) Costing	17
	B) Ordering	
CLASS 6	Estimating	17
	A) Labor time	
CLASS 7	Millwork planning	
CLASS 8	Knife Layout	
CLASS 9	Installation planning	
CLASS 10	Fill, overrun, and review	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

IE2
20 Practical Problems In Mathematics For Carpenters
Harry C. Huth
Delmar
217p. 1979

E5
28 Furniture Construction
Rudolph Willard
North Carolina State
321p. 1982

E
31 Furniture Manufacturing Processes
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435 Rapid Viz-A New Method For The Rapid Visualization Of Ideas
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William Kaufmann, Inc.
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136 Drafting Technology And Practice
Dr. William P. Spence
Bennett Pub.
807p. 1980

E7
206 Architectural Casework Details
Architectural Woodwork Institute
11p. 1969

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CLASS 1: PLANNING PROCESSES TERM 2

LECTURE OUTLINE

Introduction
Cutting lists

STUDENT ACTIVITY OUTLINE

A) Make cutting lists for the project.

Using the prints for the project and other drawings developed last term, the apprentices will make cutting lists for the project.

B) Make material lists for the project.

Task--**Read materials lists**

Using the procedures outlined in lecture and reenforced by discussion, the apprentices will make materials lists for the project.

Discuss the procedures for making cutting lists and material lists.

CLASS 2: PLANNING PROCESSES TERM 2

LECTURE OUTLINE

Math and basic geometry

STUDENT ACTIVITY OUTLINE

Task--**Use math and geometry for layout**

A) Math and geometry activity number 1

B) Math and geometry activity number 2

C) Apprentices discuss the importance of math and geometry to cabinetmaking. How is some of the math and geometry used in cabinetmaking being automated? (computer assisted drafting, computer numerical control, computer aided manufacturing, etc.)

NOTE

Details about the activities listed above are to be found in the supplemental text which acompanies the curriculum.

CLASS 3: PLANNING PROCESSES TERM 2

LECTURE OUTLINE

Layout

STUDENT ACTIVITY OUTLINE

A) Applied geometry

Task--**Determine product layout and procedure**

Task--**Use scriber, dividers and trammel points to mark lines**

Apprentices make full sized layouts of project parts. For example, full size layouts can be made for the doors and drawers.

B) Story poles

Task--**Make story pole (rod) layout**

Apprentices make story poles for the project.

Apprentices discuss the relative value of different layout methods including story poles.

CLASS 4: PLANNING PROCESSES TERM 2

LECTURE OUTLINE

Layout
A) Patterns
B) Templates

STUDENT ACTIVITY OUTLINE

A) Patterns

Task--**Lay out patterns**

Make patterns for project parts.

Apprentices make full sized patterns for appropriate project parts.

Apprentices discuss the benefits of making patterns and the different methods and materials used.

B) Templates

Task--**Lay out template**

Task--**Mark product for job identification**

Layout a template to be used on the project. This template can be made in a later term. More than one template can be laid out.

Apprentices discuss the relative value of different layout methods including story poles.

CLASS 5: PLANNING PROCESSES TERM 2

LECTURE OUTLINE

Materials lists
A) Costing
B) Ordering

STUDENT ACTIVITY OUTLINE

Task--**Use math for cutting list, hours and job billing**

A) Costing

Apprentices determine the cost of materials for the project they are building. Use cost sheets from suppliers and the materials lists made in class one of this term.

Students discuss how materials costs could be lessened for the project. Is lowering materials costs desirable? Are there any design changes that would justify increasing the cost of materials? How does the selection of materials affect quality?

B) Ordering

Apprentices compare the costs of materials from different suppliers. How does quality compare between different suppliers? How are new suppliers found?

NOTE

The apprentices should be provided with supplier's cost sheets to use in costing the project.

CLASS 6: PLANNING PROCESSES TERM 2

LECTURE OUTLINE

Estimating
A) Labor time

STUDENT ACTIVITY OUTLINE

A) Estimating labor time

Task--**Estimate your individual labor time**

Apprentices will estimate their labor time for each phase of the project. Record these estimates in a standard format. Later, the actual time can be recorded and compared with the estimate.

The apprentices discuss different methods of estimating labor (e.g. some residential cabinets are estimated on a linear foot basis while others are estimated by specific materials and labor). What are the advantages and disadvantages of the different estimating methods? How important is estimating to a cabinetmaking and millwork business?

CLASS 7: PLANNING PROCESSES TERM 2

LECTURE OUTLINE

Millwork planning

STUDENT ACTIVITY OUTLINE

A) Route sheets

Task--**Read job orders**

Make route sheets fpr the parts of the project.

Discuss work flow and production set up for the project and the shop.

CLASS 8: PLANNING PROCESSES TERM 2

LECTURE OUTLINE

Knife layout

STUDENT ACTIVITY OUTLINE

A) Layout shaper knives

Task--**lay out template**

Task--**Read blueprints**

Task--**Use math and geometry for layout**

Layout the ground-to-pattern knives template.

Discuss different types (e.g. curved, raked, etc.) of shaper knives and mouldings.

The apprentices can practice making various ground-to-pattern knife templates and making sketches of what the resultant mouldings would look like.

CLASS 9: PLANNING PROCESSES TERM 2

LECTURE OUTLINE

Installation planning

STUDENT ACTIVITY OUTLINE

A) Installation planning

Make a list on the black board of problems common to installations.

Discuss ways that cabinets can be disigned for ease of installation.

Discuss with the apprentices, how the project credenzas would be adapted to fit wall to wall or floor to cieling in a typical installation.

CLASS 10: PLANNING PROCESSES TERM 2

Fill, overrun, and review

NOTE

Class ten or eleven would be a good time for a field trip. A trip could be taken to the site of an installation, or to a shop to see a production system.

CLASS 11: PLANNING PROCESSES TERM 2

Fill, overrun, and review

CLASS 12: PLANNING PROCESSES TERM 2

Testing

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TERM SEVEN: MACHINERY

OUTLINE		CHAPTER
CLASS 1	Circle saws	26
	A) In line rip saws	
	B) Variety saws	27
	C) Radial saws	
	D) Sliding table saws	
CLASS 2	Jointer	31
CLASS 3	Planer	25
CLASS 4	Band saw	28
CLASS 5	Bench grinder	24
	A)Abrasive wheels	
CLASS 6	Knife sharpening	26
	A) Shaper knife grinding	
CLASS 7	Shaper	32
	A) Single spindle	
	B) Moulder	
CLASS 8	Router	38
	A) Panel router	
	B) Table router	
	C) Pin router	
CLASS 9	Abrasive equipment	36
	A) Stroke sander	
	B) Abrasive planer	
	C) Edge sander	
	D) Disc sander	
CLASS 10	Drill press, mortisers	34
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

F
27 Production Woodworking Equipment
Rudolph Willard
North Carolina State University
300p. 1980

F
90 Power Tool Maintenance
Daniel W. Irvin
291p. 1971

G345
138 Getting The Most Out Of Your Table Saw
Rockwell International
121p. 1978

G9
139 Getting The Most Out Of Your Drill Press
Rockwell International
121p. 1978

G6
140 Getting The Most Out Of Your Band Saw
Rockwell International
121p. 1978

F59
141 Getting The Most Out Of Your Abrasive Tool
Rockwell International
122p. 1979

G
179 Woodworking Planer Practice
John E. Hyler
Ex-Cell-O Corporation
24p.

F
186 Planer Moulders: Their Performance And Productivity
Timber Research and Development Assoc.
36p. 1978

F
186 A Guide To The Use Of Saws And Cutters
Timber Research And Development Assoc.
48p. 1979

TERM NOTE

During this term the machines themselves are the main focus, rather than processes. Topics like tool maintenance and upkeep should be covered.

CLASS 1: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Introduction
Circle saws
A) In line rip saws
B) Variety saws
C) Radial saws
D) Sliding table saws

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Introduction Safety practices	Demonstrate safety practices in the shop.
Determine machine operation and sequence required Determine set up of machines or equipment Cut material to size from cutting bill	Cut the plywood or particle board panels for the cabinet and hutch cases. This includes the top, sides, partitions, bottoms, and other panels.
Mark product for job identification	Set these parts aside to be returned to in a later class.

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CLASS 2: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Jointer

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Select lumber for size and determine species	Select the lumber for the door and drawer parts.
Use thickness planer Use jointer Use straight line rip saw Use variety table saw Cut material to size from layout or print	Dimension and square the lumber for the door and drawer parts. Also, cut the lumber for the colonial/country hutch sides.
Use clamps (2)	Edge glue the lumber for the colonial/country hutch sides. (since some apprentices are not involved in edge glueing with their projects, the instuctor should involve the entire class in this task)
Mark product for job identification	Set these parts aside to be returned to in a later class.

NOTE

During this class procedures for squaring a board on six sides should be described in detail.

CLASS 3: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Planer

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use planer	Surface the colonial/country hutch sides to finished thickness.
Use manual stroke sander Use disk sander	Sand the edges and sides of the drawer faces.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

NOTE

The instructor should train the apprentices in the upkeep and maintenance of the planer.

CLASS 4: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Bandsaw

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use variety table saw	Cut the colonial/county hutch sides to finished dimension.
Use jig saw Use bandsaw	Bandsaw the upper rails of doors, hutch sides and other parts as necessary.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 5: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Bench grinder
A) Abrasive wheels
B) Other

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Layout shaper or sticker knives Grind or sharpen tools or knives for machine Use bench grinder	Grind shaper steel with the patterns made durring the planning term.
Mark product for job identification	Set these parts aside to be returned to in a later class.

NOTE

Most instructional shops have only one bench grinder, and all of the apprentices may not have enough time to grind their blades in one night. Therefore, students waiting for the grinder should be occupied with research or other studies. This step of grinding shaper steel is repeated in the next class so that all of the apprentices have enough time to grind a shaper cutter.

CLASS 6: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Knife sharpening

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Layout shaper or sticker knives Grind or sharpen tools or knives for machine Use bench grinder	Grind shaper steel with the patterns made durring the planning term.

NOTE

Most instructional shops have only one bench grinder, and all of the apprentices may not have enough time to grind their blades in one night. Therefore, students waiting for the grinder should be occupied with research or other studies.

CLASS 7: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Shaper
A) Single spindle
B) Moulder

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use single-spindle shaper	Set up shaper and run the credenza counter tops.
Use single-spindle shaper	Run any other practice cutters that are appropriate (e.g. any cutters that an apprentice may have made for practice).
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 8: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Router

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Choose type of cutting head or tool required (8) Use table router Use panel router	Cut miscellaneous dados and rabbets in the panels. Only mill the dados and rabbets for which there is time. The remainder of the milling should be done in the following two terms.
Mark product for job identification	Set these parts aside to be returned to in a later class.

NOTE

Apprentices can design router tables for specific purposes like making sliding dovetail drawers.

Since it is unlikely that the instructional shop will have a panel router, the instructor may want to arrange for a hand out or a field trip.

CLASS 9: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Abrasive equipment
A) Stroke sander
B) Abrasive planer
C) Edge sander
D) Disc sander

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use disk sander Use manual stroke sander	Use stationary sanders as appropriate to sand parts. (colonial/country hutch sides, drawer faces, etc.)

CLASS 10: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Drill press
Mortisers

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Choose type of cutting head or tools required	If available, machine mortise or drill for some joints in stile and rail panels. (e.g. various attachments for the drill press could be practiced with.
Use jig saw	Each apprentice will make some cuts on the stationary jig saw for practice.

NOTE

Because the instructional shop is unlikely to have all the machinery required, this term would be a good time for some well organized field trips to acquaint the apprentices with the machinery outlined in the tasks.

CLASS 11: MACHINERY TERM

Miscellaneous machinery
Fill, overrun, and review

CLASS 12: MACHINERY TERM

Testing

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TERM EIGHT: MACHINE PROCESS TERM 1

OUTLINE		CHAPTER
CLASS 1	Working from cutting bill, print, layout	17
CLASS 2	Sequence of work and type of machine	
CLASS 3	Table saw blades, dado heads	
CLASS 4	Table saw A) Rip B) Crosscut C) Sliding table C) Over arm fence	26
CLASS 5	Table saw	26
CLASS 6	Band saw	28
CLASS 7	Jointer and planer	25, 31
CLASS 8	Templates and jigs	
CLASS 9	Drill press	34
CLASS 10	Templates and jigs	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

G345
138 Getting The Most Out Of Your Table Saw
Rockwell International
121p. 1978

G9
139 Getting The Most Out Of Your Drill Press
Rockwell International
121p. 1978

G6
140 Getting The Most Out Of Your Band Saw
Rockwell International
121p. 1978

G
179 Woodworking Planer Practice
John E. Hyler
24p.

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CLASS 1: MACHINE PROCESSES TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Introduction
Working from cutting bill, print, layout

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Cut material to size from cutting bill Determine machine operation and sequence required	Review cutting bills and route sheets developed in the planning process term. Cut the shelves for the project.
Use jointer Use variety table saw Cut material to size from cutting bill Determine set up of machines or equipment	Review cutting bills and route sheets developed in the planning process term. Cut the miscellaneous banding for the project (e.g. banding for shelves and plywood parts).

CLASS 2: MACHINERY TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Sequence of work and type of machine

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Determine machine operation and sequence required Cut materials to size from cutting bill	Review cutting bills and route sheets developed in the planning process term. Then, cut the plywood drawer parts to size.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 3: MACHINE PROCESSES TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Table saw blades, dado heads

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Mark product for part alignment Set cutter head of tool for prescribed operation	Mill stub tenon on shelves and wood banding.
Choose type of cutting head or woodworking tool required Determine machine operation and sequence required	Mill the dados in the drawer sides to fit the bottoms.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

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CLASS 4: MACHINE PROCESSES TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Table saw
A) Rip
B) Crosscut
C) Sliding table
D) Over arm fence

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use variety table saw Determine set-up of machines or equipment Use patterns	Here, the versatility of the table saw should be explored. Use the table saw to cut the legs for the traditional and colonial/country style cabinets. Practice can be done with various table saw techniques and accessories.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 5: MACHINE PROCESSES TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Table saw

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Determine set up of machines or equipment Determine machine operation and sequence required Use variety table saw	Cut the miscellaneous cabinet parts for all cabinets (e.g. the top rail for the traditional style hutch, the kick plate and leg parts, the handles for contemporary cabinet, etc.).
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 6: MACHINE PROCESSES TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Band saw

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use band saw Use patterns	Bandsaw the upper rails of doors and other parts as necessary.
Use bandsaw	For practice, make a cabricle leg as if it were incorporated into the traditional style cabinet. Also, use the band saw to resaw lumber. (optional)
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

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CLASS 7: MACHINE PROCESSES TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Jointer and planer

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Mark cutting lines Use jointer	Practice by making a taper on a piece of scrap lumber using the jointer.
Use planer	Plane any lumber that may be required to finish the project.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

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CLASS 8: MACHINE PROCESSES TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Templates and jigs

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Mark product for part alignment Layout template	Those apprentices making a contemporary style cabinet should layout a template for the door handle (routing the dove tail). The other apprentices should design and layout a template as the instructor deems appropriate.
Determine machine operation and sequence required.	Cut out template parts. Assemble the template.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 9: MACHINE PROCESSES TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Drill press
A) Hole saw
B) Swing cutter

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use drill press Use hole saw and swing cutters	Make practice holes, or holes in templates--to hang them up with
Use templates Determine set up of machines or equipment Determine machine operation and sequence required Use variety table saw	Mill the miscellaneous cabinet parts for all cabinets (e.g. the top rail for the traditional style hutch, the kick plate and leg parts, the handles for the contemporary cabinet, etc.).

CLASS 10: MACHINE PROCESSES TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Templates and jigs

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use templates (jigs)	Apprentices will design and make any templates or jigs that remain to be made for the project. Also, apprentices can make experimental jigs at the discretion of the instructor.

NOTE

Class ten or eleven would be a good oportunity for a field trip to a local cabinetmaking business to see the various machine processes used.

CLASS 11: MACHINE PROCESSES TERM 1

Fill, overrun, and review

CLASS 12: MACHINE PROCESSES TERM 1

Testing

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TERM NINE: MACHINE PROCESSES TERM 2

OUTLINE		CHAPTER
CLASS 1	Dado rabbet joints	1
CLASS 2	Rabbet joints	
CLASS 3	Spline joints-dowell joints	
CLASS 4	Drawer joints	
CLASS 5	Mortise and tenon joints	
CLASS 6	Lock mitre joints	
CLASS 7	Coves and moulding	
CLASS 8	Dovetail joints	
CLASS 9	Finger joints	
CLASS 10	Mechanical joints	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

G345
138 Getting The Most Out Of Your Table Saw
Rockwell International
121p. 1978

G9
139 Getting The Most Out Of Your Drill Press
Rockwell International
121p. 1978

G6
140 Getting The Most Out Of Your Band Saw
Rockwell International
121p. 1978

G
179 Woodworking Planer Practice
John E. Hyler
24p.

TERM NOTES

During this term the apprentices will learn to make a variety of woodworking joints. Each of these joints should be used for practice and research purposes. Have scrap parts on hand in a variety of materials.

There should be time this term for the apprentices to research a variety of joinery techniques. A research project on joinery could be arranged. (e.g. the apprentices could design and build a small project utilizing a variety of joinery, and write a report documenting their procedures, observations, and conclusions)

The mortising for the Mod-Ease fasteners is given shop time during class ten. The instructor should determine if one class is enough time and make any necessary arrangements.

For the purpose of learning, each cabinet that has frame and panel doors shall have two doors joined with dowell joints and two doors joined with mortise and tenon joints.

CLASS 1: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Introduction
Dado rabbet joints

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Mark inter-related parts Cut dado rabbet joints	Cut dado rabbet joints in the appropriate drawer parts.
Determine materials Cut dado rabbet joints	Cut dado rabbet joints in a variety of materials. Apprentices can then test these joints for strength and other characteristics. Ask the apprentices for suggested uses of dado rabbet joints.

CLASS 2: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Rabbet joints

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Cut rabbet joint	Cut any remaining rabbet joints for the project. Cut any rabbet joints necessary for practice.
Choose type of cutting head or tool required	Apprentices work on their research project.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 3: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Spline joints, dowell joints

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Cut spline joint	Cut the spline joint which holds the wooden handles to the contemporary cabinet doors. Cut any other spline joints necessary for the project or to master the task.
Mark product for part alignment Mark inter-related parts Cut dowell joint	Cut dowell joints in the door rail and stiles.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

NOTE

For the purpose of learning, each cabinet that has frame and panel doors shall have two doors joined with dowell joints and two doors joined with mortise and tenon joints.

CLASS 4: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Drawer joints

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Choose type of cutting head or tool required	Apprentices research, discuss, test, and practice different drawer joinery.

NOTE

The drawer parts for the project are milled during other classes. This class is a good opportunity to work with and discuss the wide variety of joinery used in drawer construction.

CLASS 5: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME 2 HOURS

Mortise and tenon

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Safety practices are demonstrated in the shop.
Use templates Use variety table saw	Mill the tenons on the door rails.
Use drill press Choose type of cutting head or tool required	Cut the mortises in the door stiles.
Determine machine operation and sequence required	Apprentices should practice with different types and uses of mortise and tenon joints.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 6: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Lock mitre

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Choose type of cutting head or tool required	Apprentices research, discuss, test and practice lock mitre joints.

NOTE

There are no lock mitres used on the project. This class is a good opportunity to work with and discuss lock mitre joints and their various applications. If appropriate, the apprentices can work on a small project like a fixture which would incorporate a lock mitre joint.

CLASS 7: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Coves and moulding

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Mark cutting lines Use variety table saw Determine set-up of machines or equipment Use patterns	Cut the covings and the mouldings for the traditional style cabinet. Cut the coving on the legs of the traditional and colonial/country style cabinets.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

NOTE

Demonstrate how to cut a cove with an angled fence on the table saw.

CLASS 8: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Dovetail joints

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Mark cutting lines Use templates (jigs) Determine set up of machines or equipment	Cut sliding dovetails for two of the drawers in each cabinet.
Determine machine operation or sequence required	Practice making a variety of dovetails with power and hand tools.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 9: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Finger joints

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Mark inter-related parts Mark product for alignment Determine set up of machines or equipment	Cut the finger joints for the rear corners of two of the drawers.
Use band saw Cut material for size from layout or print	For the purpose of practice the apprentices will join two boards with finger joints. This activity can be a part of a research project.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 10: MACHINE PROCESSES TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Mechanical joints

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Use templates (jigs)	Cut the mortises for the Mod-Ease fasteners.

NOTE

The mortising for the Mod-Ease fasteners will probably take more than one class. The instructor should make arrangements to provide additional time during other classes.

CLASS 11: MACHINE PROCESSES TERM 2

Fill, overrun, and review

CLASS 12: MACHINE PROCESSES TERM 2

Testing

TERM TEN: ASSEMBLY TERM 1

OUTLINE		CHAPTER
CLASS 1	Nomenclature and history	38
CLASS 2	Frame and panel construction	44
CLASS 3	Doors and windows	10
CLASS 4	Case work construction	51, 52
	A) European	53
	B) Face frame	
CLASS 5	Cabinet doors	45
CLASS 6	Cabinet drawers	46
CLASS 7	Kitchen cabinets	53
CLASS 8	Fixtures	66
	A) Design for installation	
CLASS 9	Showcases and furniture	66
CLASS 10	Architectural furnishings and staircases	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

H10b
71 Interior Finish: More Tricks Of The Trade
Bob Byvanen
East Woods Press
126p. 1982

H10a
74 Stair Layout
Stanley Badzinski, Jr.
American Technical Publishers
72p. 1971

F
27 Production Woodworking Equipment
Rudolph Willard
North Carolina State University
300p. 1980

H3
111 Purpose-Made Joinery
E. V. Foad
Van Nostrand Reinhold
204p. 1982

TERM NOTES

The parts to be assembled this term are the doors, drawers, shelves, and cabinet bases.

The activities this term should rienforce the knowlege learned during the planning processes terms.

CLASS 1: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Nomenclature and history

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Fit plastic laminate joints Roll contact cement Use laminate router Cut and install plastic laminate	Apply the laminate edges to the contemporary doors. Then apply the laminate door faces.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

NOTE

To gain experience, the apprentices who are working on the frame and panel doors should watch and discuss the plastic laminate work on the contemporary cabinet. They may also do some practice work with plastic laminate. Jigs or fixtures can be designed to practice with plastic laminate.

CLASS 2: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Frame and panel construction

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Pre-assemble to determine fit	Dry-assemble the doors on the traditional and colonial/country style cabinets to make sure that the parts fit.
Fit and fasten parts together with dowels Use clamps Fasten parts together with glue only	Assemble the doors for the traditional and colonial/country style cabinets.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

NOTE

Those apprentices working on a contemporary style door should watch and discuss the assembly of the frame and panel doors.

CLASS 3: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Doors and windows

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Sand to prepare for finish	Sand the doors on the faces. Carefully sand the door edges. Later the doors can be fit to the cases.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 4: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Case work construction
A) European
B) Face frame

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Fit plastic laminate joints Roll contact cement Use laminate router Cut and install plastic laminate	Apply the laminate edges to the contemporary cabinet shelves. Then apply the laminate shelf faces.
Use clamps	Glue and clamp the shelf banding on the shelves for the traditional and colonial/country style cabinets.
Fit and fasten parts together with splines Use clamps	Glue the wooden handles onto the contemporary doors.
Use file Use laminate router	Refine the edges on the contemporary doors.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 5: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Cabinet doors

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Fit and fasten parts together with hinges	Do any milling necessary to the doors in order to fit the hinges.
Sand to prepare for finish	Do any refining, sanding or filing necessary to finish the doors and shelves.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 6: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Cabinet drawers

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Pre-assemble to determine fit	Dry assemble the drawer parts to assure fit. (the rabbet joint box drawers)
Choose product assembly methods and procedures	Assemble the drawers.
Use clamps	Assemble the box drawers with glue.
Pre-assemble to determine fit	Dry assemble the drawer parts to assure fit. (the sliding dovetail drawers)
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

NOTE

Discuss drawer assembly with the apprentices.

CLASS 7: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Kitchen Cabinets

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Fit and fasten parts together with screws	Assemble the bases. In the contemporary cabinet this will be a pedestal base. The traditional and colonial/country style cabinets will have mitred legs.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 8: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Fixtures
A) Design for installation
B) Other

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Apply wood edges Fasten parts together with glue only	Edge band the panels for the project.

NOTE

If there is time available the apprentices can discuss assembly techniques.

CLASS 9: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Showcases and furniture

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Sand to prepare for finish	Sand the edge banded panels for the traditional and colonial/country style cabinets.
Fit plastic laminate joints Roll contact cement Use laminate router Cut and install plastic laminate	Apply the laminate edges and faces to the contemporary cabinet panels.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 10: ASSEMBLY TERM 1

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Architectural furnishings and staircases

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Sand to prepare for finish	Refine the cabinet parts made thus far.
Attach hardware to complete assembly	Attach the Mod-Ease fasteners in the mortises of the panels.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

NOTE

Class ten or eleven would be a good opotunity to either finish up any work on the project or take a field trip.

CLASS 11: ASSEMBLY TERM 1

Fill, overrun, and review

CLASS 12: ASSEMBLY TERM 1

Testing

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TERM ELEVEN; ASSEMBLY TERM 2

OUTLINE		CHAPTER
CLASS 1	Print and layout reading	16
CLASS 2	Assembly layout	
	A) Pre-assembly	
	B) Other	
CLASS 3	Appropriate use of	11
	A) Staples	
	B) Screws	
	C) Clamps	
CLASS 4	Plastic laminate layout	43
	A) Procedures	
	B) Timing	
CLASS 5	Plastic laminate work	
	A) Jointing	
	B) Inlay	
CLASS 6	Wood edging and trim	
CLASS 7	Cabinet door hardware	
CLASS 8	Cabinet drawer hardware	
CLASS 9	Quality control check	
	A) Hardware	
	B) Sanding	
CLASS 10	Finish hardware	
CLASS 11	Fill, overrun and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

H10b
71 Interior Finish: More Tricks Of The Trade
Bob Byvanen
East Woods Press
126p. 1982

H10a
74 Stair Layout
Stanley Badzinski, Jr.
American Technical Publishers
72p. 1971

F
27 Production Woodworking Equipment
Rudolph Willard
North Carolina State University
300p. 1980

H3
111 Purpose-Made Joinery
E. V. Foad
Van Nostrand Reinhold
204p. 1982

OREGON CABINETMAKERS AND WOODWORKERS
APPRENTICESHIP TRAINING CURRICULUM
INSTRUCTOR'S MANUAL

CLASS 1: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Introduction
Print and layout reading

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Pre-assemble to determine fit Read story pole (rod) layout	Pre-assemble the hutch tops. Use the story pole made during the planning terms to verify accuracy of layout.
Attach hardware to complete assembly Fit and fasten parts together with screws	Assemble the hutch tops
Fit and fasten parts together with nails	Nail the cove moulding onto the top of the traditional cabinet.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

NOTE

During this term the instructor can guide discussions of assembly techniques and problems with the apprentices.

Class one and two are devoted to the assembly of the hutch top. Continue any work not finished during class one in class number two.

CLASS 2: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Assembly layout
A) Pre-assembly
B) Other

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Inspect product for loose joints Inspect product for mis-matched grain Attach hardware to complete assembly Fit and fasten parts together with screws	Assemble the hutch tops.
Sand to prepare for finish	Sand the wooden parts to prepare for finish.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

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CLASS 3: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Appropriate use of
A) Staples
B) Screws
C) Clamps

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Pre-assemble to determine fit Read story pole (rod) layout	Pre-assemble the credenzas. Use the story pole made during the planning terms to verify accuracy of layout.
Attach hardware to complete assembly Fit and fasten parts together with screws	Assemble the credenzas.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

NOTE

During this term the instructor can guide discussions of assembly techniques and problems with the apprentices.

There are two classes devoted to the assembly of the credenzas. Continue any unfinished work during class number four.

CLASS 4: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Plastic laminate layout
A) Procedures
B) Timing

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Inspect product for loose joints Inspect product for mis-matched grain Attach hardware to complete assembly Fit and fasten parts together with screws	Assemble the credenzas.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 5: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Plastic laminate work
A) Jointing
B) Inlay

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Fit and fasten parts together with screws Attach hardware to complete assembly	Attach the door hardware and fit the doors to the credenza.
Adjust moving parts to obtain correct fit	Adjust the doors.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 6: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Wood edging and trim

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Attach hardware to complete assembly	Attach the hardware for the drawers.
Adjust moving parts to obtain correct fit	Adjust the drawers.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 7: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Cabinet door hardware

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Fit and fasten parts together with screws	Assemble the bases and legs onto the cabinets.
Pre-assemble to determine fit	Fit the hutch tops and bottoms together to assure fit.
Pre-assemble to determine fit	Place the shelves in place to assure that they fit.
Mark product for job identification	Mark and set these parts aside to be returned to in a later class.

CLASS 8: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Cabinet drawer hardware

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Sand to prepare for finish	Do any sanding necessary to prepare the project for for finishing.
Inspect products for mismatched grain Inspect products for missing hardware Inspect product for loose joints	Inspect the cabinets and finish any remaining details.

CLASS 9: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Quality control check
A) Hardware
B) Sanding

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Inspect products for mismatched grain Inspect products for missing hardware Inspect product for loose joints	Inspect the cabinets and finish any remaining details.

NOTE

During this class the instructor can guide a discussion of quality control and inspection in a woodworking business.

CLASS 10: ASSEMBLY TERM 2

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Finish hardware

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Safety practices are demonstrated in the shop.
Inspect products for mismatched grain Inspect products for missing hardware Inspect product for loose joints	Inspect the cabinets and finish any remaining details.

NOTE

During this class the apprentices can finish any remaining work necessary to prepare the cabinets and other miscellaneous parts for the finishing term to follow. Also, field trips or other activities can take place during classes ten and eleven.

CLASS 11: ASSEMBLY TERM 2

Fill, overrun, and review

CLASS 12: ASSEMBLY TERM 2

Testing

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TERM TWELVE: FINISHING TERM

OUTLINE		CHAPTER
CLASS 1	Importance of finish A) Terminology B) Pre-finish operations	56
CLASS 2	Wood stain A) Color theory B) Other	59
CLASS 3	Equipment and maintenance	57
CLASS 4	Wood stain application A) Step panel B) Oil finishes	59
CLASS 5	Fillers and sealing	60
CLASS 6	Top coats	61
CLASS 7	Top coats	
CLASS 8	Repair and rubbing	62
CLASS 9	Paint	
CLASS 10	Fill, overrun, and review	
CLASS 11	Fill, overrun, and review	
CLASS 12	Testing	

SUPPLEMENTAL READING

O
6 Furniture Finishing Textbook
Furniture Production Pub. Co.
120p. 1977

D
61 Finishing Technology
George A. Soderberg
McKnight and McKnight
308p. 1969

D
184 Binks Training Materials
Content: safety spray booths, application processes, spray equipment selection

NOTE

During this term the apprentices working on the contemporary cabinets will have less wood to finish. They should finish the extra doors from term one and any other wooden pieces like jigs or fixtures that the instructor deems appropriate.

This is a good term for research projects by the apprentices. The research format learned during the materials term can be used. Reports made by the apprentices to the class as a whole are a good way to share resources and develop communication skills.

The instructor should arrange class activities so as to fascilitate lecture-topics and finishing the project.

The instructor should be prepared with additional activities for the apprentices.

CLASS 1: FINISHING TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Introduction
Importance of finish
A) Terminology
B) Pre-finish operations
C) Types

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Fill wood cracks or dents with filler Inspect for glue spots Inspect for scratches that would show in finish Sand to prepare for finish	Prepare the cabinets for finishing.

CLASS 2: FINISHING TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Wood stain
A) Color theory
B) Other

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Wipe stain Fill wood cracks or dents with filler Inspect for glue spots Inspect for scratches that would show in finish Sand to prepare for finish	Continue to refine the cabinets for finishing. The apprentices can experiment with different sanding and refining techniques and their suitability to staining--on scrap lumber.

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CLASS 3: FINISHING TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Equipment and maintenance

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop. **Fire prevention** and the flammability of finishing materials should be stressed.
Determine set up of machines or equipment	The apprentices practice the maintenace and upkeep of finishing equipment.

NOTE

This is a good term for research projects by the apprentices. The research format learned during the materials term can be used.

The instructor should arrange class activities so as to rienforce lecture-topics and finishing the project.

Cover fire prevention and extinction topics with the apprentices. The different types of fire extinguishers should be included.

CLASS 4: FINISHING TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Wood stain application
A) Step panel
B) Oil finishes

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Wipe stain Inspect for glue spots Inspect for blemishes Inspect for scratches that would show in finish	Stain the cabinets and miscellaneous pieces.

CLASS 5: FINISHING TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Fillers and sealing

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Fill wood cracks or dents with filler	The apprentices can practice and experiment with different fillers and sealers. Also, the apprentices can do any remaining work necessary to prepare the cabinets for spray finishing.

CLASS 6: FINISHING TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Top coats

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Spray finishes	Apply the finish.

CLASS 7: FINISHING TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Top coats

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Spray finishes	Apply the finish.

NOTE

During these two classes the apprentices can finish their cabinets and practice different finishing processes.

CLASS 8: FINISHING TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Repair and rubbing

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.
Inspect for blemishes	The apprentices repair any problems in the finish.

NOTE

During this class the apprentices can be instructed in, and practice, tasks like: steaming dents, spraying contact cement, hand fashioning patches, and rolling paint.

CLASS 9: FINISHING TERM

LECTURE-DEMONSTRATION OUTLINE: TIME-2 HOURS

Paint

SHOP WORK: TIME-2 HOURS

TASK	PROJECT STEPS
Safety practices	Demonstrate safety practices in the shop.

NOTE

The activities for the remainder of the term are at the instructors discretion. A field trip is recommended. Also, any reports on research relevant to finishing can be given during these classes.

CLASS 10: FINISHING TERM

Fill, overrun and review

CLASS 11: FINISHING TERM

Fill, overrun and review

CLASS 12: FINISHING TERM

Testing